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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/766,035

01/29/2004

Masanobu Ando

F03-363-US

2444

21254

7590

01/25/2006

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EXAMINER

LANE, JEFFREY D

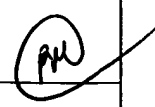
ART UNIT

PAPER NUMBER

2828

DATE MAILED: 01/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/766,035	Applicant(s) ANDO ET AL.	
	Examiner Jeffrey D. Lane	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 August 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8-11 and 15-20 is/are rejected.
- 7) ☒ Claim(s) 6, 7, and 12-14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/29/04</u> . | 6) <input type="checkbox"/> Other: _____  |

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 3 and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 3 and 5 recites the limitation "said semiconductor layer" in 2nd to last line in claim 3 and paragraph 2 line 3 in claim 5. There is insufficient antecedent basis for this limitation in the claim. There is more than 1 semiconductor layer, ie. The substrate, the contact layer and the active layer. For examination purposes where it reads "said semiconductor layer" it will be interpreted as "at least one of the semiconductor layers".

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 8-11 and 15-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Sermage et al. (US 4,779,280).

As for claim 1, Sermage discloses, an edge-emitting type semiconductor laser (See title) in which a laser cavity is formed by depositing plural semiconductor layers 14,

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15, 16, 18, 20, and 22 on a crystal growth substrate 10, comprising: a substrate 10; an n-type contact layer formed above said substrate 15; and an active layer formed above said n-type contact layer 18; wherein thickness of at least a part of said n-type contact layer which is right under said laser cavity is thinner than a value  $\Lambda$  (See Columns 7-9) of a function of a luminous wavelength  $\lambda$  (See Column 1 lines 24-29), determined by the formula " $\Lambda \equiv f(\lambda) = \lambda(n^2 - n_{eq}^2)^{-1/2}/2$ " in which  $\lambda$ ,  $n$ , and  $n_{eq}$  are represented by: luminous wavelength in said active layer; refractive index of said n-type contact layer which depends on said luminous wavelength  $\lambda$ ; and equivalent refractive index of said n-type contact layer in guided wave mode which depends on said luminous wavelength  $\lambda$  (See Column 2 lines 51-59). For calculation purposes examiner is using the  $n_{eq}$  at the concave part. The index of refraction at 0.8  $\mu\text{m}$  (See Column 1 line 24) is: 3.651 for GaAs, 3.68 for  $\text{Al}_{0.1}\text{Ga}_{0.9}\text{As}$ , and 3.418 for  $\text{Al}_{0.3}\text{Ga}_{0.7}\text{As}$  (Index of refraction is an inherent property based on materials used and wavelength of the light being used). The equivalent index of based on the wavelength and the thicknesses of the materials (See Column 2 lines 51-59 and column 3 lines 7-9) is  $n_{eq} = 3.455$ . Therefore  $\Lambda = 0.315 \mu\text{m}$ .

As for claim 2, Sermage discloses in figure 2, an edge-emitting type semiconductor laser according to claim 1, wherein a concave part or a cavity part is formed at least a part right under said laser cavity (shown by 12 touching 15).

As for claim 3, Sermage discloses in figure 2, an edge-emitting type semiconductor laser according to claim 2, wherein said concave part (where 12 and 15 meet) is formed by evaporating (See MPEP 2113, included below for convenience) at

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least a portion of at least one of the semiconductor layers 10 or 14 which is placed right under said laser cavity by laser irradiation.

The MPEP states

**2113 Product-by-Process Claims [R-1]**

**PRODUCT-BY-PROCESS CLAIMS ARE NOT LIMITED TO THE MANIPULATIONS OF THE RECITED STEPS, ONLY THE STRUCTURE IMPLIED BY THE STEPS**

“[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted) (Claim was directed to a novolac color developer. The process of making the developer was allowed. The difference between the inventive process and the prior art was the addition of metal oxide and carboxylic acid as separate ingredients instead of adding the more expensive pre-reacted metal carboxylate. The product-by-process claim was rejected because the end product, in both the prior art and the allowed process, ends up containing metal carboxylate. The fact that the metal carboxylate is not directly added, but is instead produced in-situ does not change the end product.).

As for claim 4, Sermage discloses, An edge-emitting type semiconductor laser according to claim 1, comprising: a concave part which reaches said n-type contact layer 15 from the back surface of said crystal growth substrate 10 and exists at least right beneath said laser cavity (shown by 12 touching 15).

As for claim 5 Sermage discloses in figure 2, an edge-emitting type semiconductor laser in which a laser cavity (shown by 12 touching 15) is formed by depositing plural semiconductor layers on a crystal growth substrate 10, comprising: a concave part which is formed at the bottom of said laser cavity by removing said crystal growth substrate and at least one of the semiconductor layers existing at least right

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beneath said laser cavity from the back surface of said crystal growth substrate (See column 2 line68- column 3 line 2); wherein removing process is carried out until thickness of an n-type contact layer becomes thinner than a value  $\Lambda$  (See Column 3 lines 7- 9) of a function of a luminous wavelength  $\lambda$ , determined by the formula " $\Lambda \equiv f(\lambda) = \lambda(n - n_{eq})^2$ " in which  $\lambda$ ,  $n$ , and  $n_{eq}$  are represented by: luminous wavelength of an active layer; refractive index of said n-type contact layer which depends on said luminous wavelength  $\lambda$ ; and equivalent refractive index of said n-type contact layer in guided wave mode which depends on said luminous wavelength  $\lambda$  (See Column 2 lines 51-59). For calculation purposes examiner is using the  $n_{eq}$  at the concave part. The index of refraction at 0.8  $\mu\text{m}$  (See Column 1 line24) is: 3.651 for GaAs, 3.68 for  $\text{Al}_{0.1}\text{Ga}_{0.9}\text{As}$ , and 3.418 for  $\text{Al}_{0.3}\text{Ga}_{0.7}\text{As}$  (Index of refraction is an inherent property based on materials used and wavelength of the light being used). The equivalent index of based on the wavelength and the thicknesses of the materials (See Column 2 lines 51-59 and column 3 lines 7-9) is  $n_{eq} = 3.455$ . Therefore  $\Lambda = 0.315 \mu\text{m}$ .

As for claims 8, 9, 10, and 11, Sermage discloses all that pertains to claims 4 and 5 see above. Sermage further discloses, a metal layer 12 is formed in the entire portion of said concave part and wherein a negative electrode 12 is formed by using said metal layer or said metal part.

As for claims 15-18, Sermage discloses all that pertains to claims 1-5 respectively. Sermage shows that the thickness of the n-type contact layer is between  $\Lambda/5$  (0.063  $\mu\text{m}$ ) and  $\Lambda$  (0.315  $\mu\text{m}$ ). The thickness is 0.2  $\mu\text{m}$  (see column 3 lines 7-9).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sermage et al. (US 4,779,280) in view of Schimpe (US 6,282,345). Sermage discloses all that pertains to claim 1. Sermage further shows that the thickness of the n-type contact layer is between  $\Lambda/5$  (0.063  $\mu\text{m}$ ) and  $\Lambda$  (0.315  $\mu\text{m}$ ). The thickness is 0.2  $\mu\text{m}$  (see column 3 lines 7-9). However Sermage does not disclose using a DFB structure. Schimpe discloses, "The DFB grating 82 is not required for the function of the arrangement 1 but is intended to enable as needed the frequency selection in, for example, a laser diode." (Column 6 lines 63-65). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a DFB structure in Sermage's laser to enable frequency selection.

***Allowable Subject Matter***

5. Claims 6, 7, and 12-14 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As for claims 6 and 7, there is not found with in the references cited an edge-emitting type semiconductor laser where the thickness of the of the n-type contact layer, formed on the substrate, is less than  $\Lambda$  (as  $\Lambda$  is defined in claims 1 and 5) and with an n-type clad layer wherein a dielectric film or a semiconductor film having smaller refractive index than that of said n-type clad layer is formed at the bottom of said n-type contact layer exposed in said concave part.

As for claims 12-14 there is not found with in the references cited an edge-emitting type semiconductor laser where the thickness of the of the n-type contact layer, formed on the substrate, is less than  $\Lambda$  (as  $\Lambda$  is defined in claims 1 and 5) and where the top is etched so that the upper surface is exposed of n-type contact layer and a negative electrode is formed on the exposed surface, and where a p-type or undoped Group III nitride is formed between the n-type contact layer and the substrate.

### ***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. "<http://www.luxpop.com/>" contains the index of refraction of several materials based on their wavelengths.



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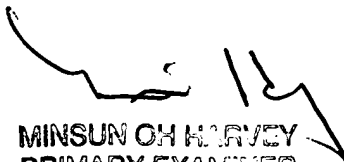
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey D. Lane whose telephone number is (571) 272-1676. The examiner can normally be reached on Monday thru Friday 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Jeffrey D Lane  
Examiner  
Art Unit 2828

JDL

  
MINSUN OH HARVEY  
PRIMARY EXAMINER